

BULLETIN

OF THE INSTITUTE OF METALS

VOLUME I

MARCH 1952

PART 7

Death of His Majesty King George VI

It is with deep regret that we record the death, at Sandringham, on Wednesday, 6 February 1952, of His Majesty King George VI, and we would express the sincere sympathy of the members of the Institute of Metals with Her Majesty The Queen and the members of the Royal Family in their bereavement.

INSTITUTE NEWS

**Annual General Meeting, London, Monday,
24 March to Thursday, 27 March**

Members are reminded that the full programme of this meeting was published on pp. 37-38 of the last (February) issue of the *Bulletin*. Members resident in Great Britain should also have received, separately, a printed programme of the meeting with Reply Form.

A varied and attractive programme has been arranged, and it is hoped that there will be a large attendance. Those who require tickets for the social functions are requested to advise the Secretary as early as possible.

Visitors may attend all social functions as guests of members and will be welcome (no tickets are required) at the May Lecture and the scientific and technical sessions.

Awards of Medals

The Council has made the following awards of medals for 1952:

The Institute of Metals (Platinum) Medal to Mr. WILLIAM SYDNEY ROBINSON, until recently President of the Consolidated Zinc Corporation, Ltd., in recognition of his outstanding services to the non-ferrous metal industries in developing the Australian zinc-lead industry and the British zinc industry.

The W. H. A. Robertson Medal to Mr. CYRIL ERNEST DAVIES, for his paper on "The Cold-Rolling of Non-Ferrous Metals in Sheet and Strip Form", published in the *Journal*, 1950-51, vol. 78, pp. 501-536.

The Rosenhain Medal to Professor ANDRÉ GUINIER, Conservatoire National des Arts et Métiers, Paris, in recognition of his outstanding contributions in the field of physical metallurgy, particularly in connection with precipitation phenomena.

The W. H. A. Robertson Medal and the Rosenhain Medal will be presented at the Luncheon to be held at the Park Lane Hotel, London, W.1, on Tuesday, 25 March. The Institute of Metals Medallist, who resides in Australia, will not be able to be present.

**"Students' " Educational Tour, Easter
Vacation, 1952**

As previously announced, an educational tour for "students" will be held in the South Lancashire area during the Easter vacation. The tour, which will be organized on inexpensive lines and will start on Monday, 31 March and end on Friday, 4 April 1952, will be open to all Junior and Student Members of the Institute (whether actually "students" or not). Accommodation has been arranged in Manchester.

Each member of the tour will go to each of the works to be visited, the programme of which is as follows (all are half-day visits, except where otherwise stated): The British Aluminium Co., Ltd., Warrington; British Insulated Cables, Ltd., and British Copper Refiners, Ltd., Prescott; Lancashire Steel Corporation, Ltd., Warrington (all-day visit); Magnesium Elektron, Ltd., Manchester; The Manganese Bronze and Brass Co., Ltd., Birkenhead; Metropolitan-Vickers Electrical Co., Ltd., Manchester; and Rylands Brothers, Ltd., Warrington.

Junior and Student Members who hope to take part in this tour are requested (without obligation) to advise the Secretary to that effect as early as possible. The cost of the tour, which will be stated in a circular letter to be sent to all who are eligible to take part, will not exceed £7, inclusive

of hostel accommodation, meals, gratuities, and transport to the works.

Recently the Managing Directors of 23 important firms in the industry were asked their views regarding continuation of these tours. Almost unanimously, they expressed their appreciation of the educational value of the tours to young men in industry, recommended their continuation, and undertook to encourage (and, in many cases, financially to assist) young men on their scientific and technical staffs to take part in them. Junior and Student Members should, therefore, have no hesitation in requesting leave of absence for this purpose.

Council: Elections for 1952-53

The following members have been elected to fill vacancies on the Council and will take office on 25 March, 1952:

President:

C. J. SMITHELLS, M.C., D.Sc., Director of Research, The British Aluminium Co., Ltd., Gerrards Cross, Bucks.

Vice-Presidents:

G. L. BAILEY, C.B.E., M.Sc., Director, British Non-Ferrous Metals Research Association, London.

S. F. DOREY, C.B.E., D.Sc., Wh.Ex., F.R.S., Chief Engineer Surveyor, Lloyd's Register of Shipping, London.

Honorary Treasurer:

E. H. JONES, Director and General Manager (Bristol), Capper Pass and Son, Ltd., Bristol.

Ordinary Members of Council:

ALFRED BAER, B.A., Vice-Chairman, The Consolidated Zinc Corporation, Ltd., London, and Chairman, H. J. Enthoven and Sons, Ltd., London.

N. I. BOND-WILLIAMS, B.Sc., Chairman and Managing Director, Aston Chain and Hook Co., Ltd., Birmingham.

N. P. INGLIS, Ph.D., M.Eng., Research Director, Imperial Chemical Industries, Ltd., Metals Division, Birmingham.

IVOR JENKINS, D.Sc., Chief Metallurgist, Research Laboratories, The General Electric Co., Ltd., Wembley, Middlesex.

A. G. RAMSAY, B.Sc., Ph.D., Director, The Mond Nickel Co., Ltd., and Works Manager, The Refinery, Clydach, Glam.

H. SUTTON, D.Sc., Director, Materials Research and Development (Air), Ministry of Supply, London.

Major P. LITHERLAND TEED, A.R.S.M., Deputy Chief of Research and Development, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge, Surrey.

W. J. THOMAS, Assistant Managing Director, The British Aluminium Co., Ltd., London.

Senior Vice-President for 1952-53

As previously announced, Professor F. C. THOMPSON, D.Met., M.Sc., will serve as Senior Vice-President for the year 1952-53, and will also assume that office on 25 March 1952.

Retirements from the Council

The following members will retire from the Council with effect from 24 March 1952 and at the Annual General Meeting at the Park Lane Hotel, London, W.1, on the morning of Tuesday, 25 March, a hearty vote of thanks to them for their services to the Institute will be proposed: Colonel Sir PAUL GUETERBOCK, K.C.B., D.S.O., M.C., T.D., D.L., J.P., M.A., A.D.C. (*Past-President*); Major C. J. P. BALL, D.S.O., M.C.

INSTITUTE NEWS

(Vice-President); Mr. W. A. C. NEWMAN, O.B.E., B.Sc., A.R.S.M., A.R.C.S., D.I.C. (*Honorary Treasurer*); and Mr. D. F. CAMPBELL, M.A., A.R.S.M., Mr. T. M. HERBERT, M.A., Mr. H. W. G. HIGNETT, B.Sc., and Mr. A. R. POWELL (*Ordinary Members of Council*).

Professor A. J. MURPHY, M.Sc., also retires from office as President, but will then fill a vacancy on the Council as Past-President.

Students' Essay Prize Competition 1952

The Council of the Institute will present, annually, two prizes of twenty guineas each for the best essays submitted in accordance with the regulations set out below. Each prize will be in the form of ten guineas in money and ten guineas in scientific, technical, or other appropriate types of books, to be selected by the prizewinner. The prizes will be presented at a Luncheon during the Annual General Meeting of the Institute, when the Institute's medals are also presented, and prizewinners will be the guests of the Institute at that Luncheon. If of sufficient merit, a prize-winning essay may be published in the Institute's *Bulletin* or selected for reading before a Local Section.

Regulations

Eligibility.—The competition is open to all Student Members of the Institute and to all Associate Members of Local Sections who are eligible for Student Membership of the Institute provided that both are within the normal age limits for Student Membership, viz. 17 to 25 years. A prizewinner will be ineligible to take part in the competition in the year subsequent to that in which he or she submitted a winning essay.

Language.—Essays must be submitted in English.

Length.—Essays should be 2500–3500 words long and must not exceed 3500 words. They must be submitted in type-written form—double-line spacing.

Subject.—For the 1952 competition candidates may select a subject which comes under one or other of the following two headings. One prize will be given under each subject.

- (i) "Non-Ferrous Foundry Practice".
- (ii) "Metallography in Industry".

The subject matter should be logically presented, in good English, and should have a metallurgical content to impress the adjudicators by soundness, exercise of critical faculty, and originality of approach.

In each subject no prize will be awarded if the essays do not, in the opinion of the adjudicators, reach the requisite standard.

Method of Submission.—Each entry must be submitted to The Secretary, The Institute of Metals, 4 Grosvenor Gardens, London, S.W.1, not later than Monday, 19 May 1952, and must be accompanied by a certificate, signed by the entrant, that the essay itself is entirely his or her own work, that it has not, in the form in which it is sent, been submitted for any other competition, and clearly stating what (if any) drawings, photographs, etc., have been prepared on his or her behalf.

Appeal to Industry for Regular Financial Support of the Institute's Work

The following additional contributions have been received in response to the Council's appeal to industry for regular financial support of the work of the Institute.

The Council will be grateful for subscriptions (particularly subscriptions under covenant, on which the Institute—as a

"charity"—may recover income tax) and donations from those companies in the metallurgical and engineering industries which have not yet responded to this appeal.

A full list of contributions received up to 31 December 1951 will be found in the *Journal*, 1952 (Feb.), pp. 346 and 347, and other donations since received are listed on p. 39 of the February 1952 issue of the *Bulletin*.

A. Annual Donations Under Covenant for Not Less Than 7 Years.

	Net.			Gross, After Recovery of Tax by the Institute		
	£	s.	d.	£	s.	d.
Hopkinsons, Ltd.	26	0	0	49	11	5
Chase Non-Ferrous Metal Co., Ltd.	10	0	0	19	0	6
Winfields Rolling Mills, Ltd.	5	5	0	10	0	0

B. Donations to be Renewed Annually (Without Obligation), but Not Under Covenant.

	£	s.	d.
Arkinstall Brothers, Ltd.	25	0	0
Wickman, Ltd.	20	0	0

C. Other Donations (Some of Which May be Renewed Annually).

Colvilles, Ltd.	100	0	0
Danks (Edwin) and Co. (Oldbury), Ltd.	50	0	0
Rubery, Owen and Co., Ltd.	50	0	0
Leigh and Sillavan, Ltd.	21	0	0
Bridge Foundry Co., Ltd., The	10	10	0
G.W.B. Electric Furnaces, Ltd.	10	10	0
Metal Information Bureau, Ltd.	10	10	0
Metal Products Co. (Willenhall), Ltd.	10	10	0
Newton, Chambers and Co., Ltd.	10	0	0
Electro-Alloys, Ltd.	5	5	0
Electroflo Meters Co., Ltd.	5	5	0
Kemp (A.) and Son, Ltd.	5	5	0
Oakland Metal Co., Ltd.	5	5	0
Gascoignes Non-Ferrous Foundries, Ltd.	2	2	0

President's Visit to America

In the course of a business visit to the United States at the end of last year, the President (Professor A. J. MURPHY) had an opportunity of meeting Professor R. F. MEHL and Professor C. S. SMITH (Honorary Corresponding Members to the Council) and of discussing with them various aspects of the Institute's work, particularly in relation to publications.

"Thermodynamics of Alloys"

The monograph "Thermodynamics of Alloys", which was specially written at the invitation of the Council by Mr. John Lumsden, has now been published. Details will be found on p. 64. The published price is 35s. (\$5.50) post free, but as a privilege of membership, members are entitled to purchase one copy at 17s. 6d. (\$3.00) post free.

"Metallurgical Abstracts" Volumes Wanted

The Institute will pay £1 each for bound volumes, in good condition, of Metallurgical Abstracts, 1942 (vol. 9) and 1943 (vol. 10). Copies offered for sale should be addressed to the Secretary.

Informal Discussion on "Tool and Die Materials for the Extrusion of Non-Ferrous Metals and Alloys"

An informal discussion on "Tool and Die Materials for the Extrusion of Non-Ferrous Metals and Alloys" took place at a General Meeting of the Institute held at Birmingham University on 3 January 1952. There were present 130 people, drawn from the users of extrusion tools, the steelmakers, and the makers of extrusion presses. Before the discussion, the Aitchison Laboratories were inspected by a number of visitors, who were very much impressed by the splendid equipment installed.

The first part of the discussion was concentrated on die materials, and it was opened by Mr. S. S. SMITH (Research Manager, Metals Division, Imperial Chemical Industries, Ltd.) who gave an excellent survey, indicating some of the problems which arise from the use of steel dies in the process of extrusion. Mr. E. W. COLBECK (Director, Hadfields, Ltd.), who followed, made some pertinent observations on the problem from the viewpoint of the steelmakers. The meeting was then thrown open for full and free discussion, and over eighty contributions were made.

It is profitless to deal here with the details of the discussion, which ultimately covered the use of the extrusion press itself as a tool, but a number of quite important facts emerged from the exchange of opinions and ideas.

It was apparent, for instance, that there was a very considerable lack of liaison between the suppliers of steel and the users. It was equally apparent that some of the users of steel dealt with their materials in a somewhat unscientific way, and in some cases different users gave exactly opposite opinions about the same steels used for the same service. The treatment to which the materials were subjected during service was obviously a matter of great importance, which had not received the attention it deserved. Undoubtedly a number of users would go away from the discussion with considerable food for thought. It was clear, too, that the makers of the steels could usefully pass on more detailed information to the users about the hardening of steels which would enable them to be more knowledgeable about the operations they were carrying out. The makers of steels were still pursuing actively the problems involved in the making of steels to give even better service, but there was some evidence that better service could be obtained from existing steels if information relevant to the behaviour of steels after hardening were more freely available.

The discussion on the extrusion press as a tool was lively and informative. Clearly, the production engineer and the designer of presses had everything to gain by frequent exchanges of ideas in this field. Development along these lines must inevitably be slow, owing to the high prices of extrusion presses, but more co-operation was necessary if development was to proceed effectively and more rapidly.

It was clear that the meeting was sufficiently successful to be the precursor of others on similar lines. Naturally, a first meeting of this kind covered a rather wide field in a somewhat general manner, but the way was clearly pointed to further discussions which should cover narrower fields in greater detail. The advantages of this meeting were that a large body of people with a common engineering interest were brought together and discussed their problems freely and frankly. There will arise from this meeting a quickening of interest, a stimulation of thought, and a formation of new and individual contacts which are likely to have far-reaching effects.

Election of Members

The following 28 Ordinary Members, 8 Junior Members, and 17 Student Members were elected on 11 February:

As Ordinary Members

- ANDRIES, Fernand, Ing. Civil Mines, Head, Stedelijk Instituut voor Technisch Onderwijs, 42 Rue Leopold, Malines, Belgium.
- BARBER, Leslie A., Managing Director, Edward Barber and Co., Ltd., Paxton Road, Tottenham, London, N.17.
- BEINLICH, J. J., B.S., Manager, Bureau of Technical Information, Research and Technology, United States Steel Company, 525 William Penn Place Building, Pittsburgh 30, Pa., U.S.A.
- BROWN, Douglas, Chief Assistant Metallurgist, Langley Alloys, Ltd., Station Road, Langley, Bucks.
- BROWN, Selwyn, Dipl. Chem. Tech., Manager, Research and Development Department, John Dale, Ltd., New Southgate, London, N.11.
- CAMPBELL, Hector Stanley, B.Sc., A.R.C.S., A.R.I.C., Research Chemist, British Non-Ferrous Metals Research Association, Euston Street, London, N.W.1.
- CAMPUS, Professor Ferdinand A. A., Civ. Eng., Dr. techn. sc.h.c., Rector of The University of Liège and Head of the Civil Engineering Laboratories, 139 Quai de Rome, Liège, Belgium.
- CARR-WALKER, Charles Ian, Chairman, Yorkshire Engineering Supplies, Ltd., Upper Wortley Road, Leeds 12.
- CLAYTON-CAVE, J., Research Metallurgist, British Iron and Steel Research Association, 11 Park Lane, London, W.1.
- DUMMER, Eric Oliver, A.M.I.Mech.E., A.F.R.Ae.S., Head of the Technical Liaison Department, Aluminium Wire and Cable Co., Ltd., Port Tennant, Swansea, Glam.
- FLETCHER, Norman Farler, A.I.M., Assistant Works Manager, Imperial Chemical Industries Ltd., Metals Division, Landore, Swansea, Glam.
- FOREMAN, Frederick Charles, L.I.M., Works Metallurgist, British Railways, Southern Region, Works Metallurgical Laboratory, Ashford, Kent.
- GERSON, Frederick, B.A.Sc., A.I.M., Manager of Research and Development, John Dale, Ltd., New Southgate, London, N.11.
- GULER, Kaspar, Dipl. Ing., Managing Director, Aluminium-Industrie A.G., Chippis-Sierre, Valais, Switzerland.
- HALUPKA, Herman Augustyn, Metallurgist, The South West Africa Co., Ltd., Abenab Mine, nr. Grootfontein, South West Africa.
- HESS, James B., S.B., Research Metallurgist, Kaiser Aluminium and Chemical Corp., P.O. Box 1451, Spokane 10, Wash., U.S.A.
- HIGGINS, Brian Rowland, B.Sc., Works Director, Yorkshire Engineering Supplies, Ltd., Upper Wortley Road, Leeds 12.
- HIGGINS, Peter Beardsley, A.C.A., Managing Director, Yorkshire Engineering Supplies, Ltd., Upper Wortley Road, Leeds 12.
- HODGSON, Stephen Jerome, Rolling Mill Manager, Birmingham Battery and Metal Co., Ltd., Selly Oak, Birmingham 29.
- KIESSLING, Roland Richard, Ph.D., Head, Laboratory for Hard Metal Research, Södersfors; Lecturer at the University of Uppsala, Sweden.
- MARTIJENA, Armando, Ingeniero Militar, Altos Hornos Zapla, Palpala, Argentina.
- MAUDERLI, Bruno, Dr.sc.nat., Chief of the Laboratories, Aluminium A.G., Menziken, Switzerland.

PERSONAL NOTES

- OAKLEY, James, Metallurgical Engineer, Manganese Bronze and Brass Co., Ltd., Ipswich, Suffolk.
- PARIS, Raymond, Ing., Directeur, Usines de Navarre, Evreux (Eure), France.
- POTI, S. R. C., B.Sc. (Eng.), Assistant Works Manager, National Insulated Cable Company of India, Ltd., Shamnager (via Calcutta), India.
- PRIOR, Philip Robert, Director and General Manager, The Worcester Brass Co., Ltd., Lifford Lane, King's Norton, Birmingham 30.
- REYNOLDS, E. Austyn, B.A., Deputy Chairman, T.I. Aluminium Co., Ltd., and Director, Tube Investments, Ltd., Redfern Road, Tyseley, Birmingham 11.
- WOODWARD, Ronald Ashley, B.Sc. (Hons.), Chemist, John Dale, Ltd., New Southgate, London, N.11.

As Junior Members

- DERUYTTERE, A. E., Research Student, Department of Metallurgy, University of Sheffield.
- HALL, Maurice, Creep and Fatigue Department, Rolls-Royce Research Laboratory, Osmaston Road, Derby.
- HAWKINS, Dennis Arthur, Technical Assistant, Imperial Chemical Industries, Ltd., Metals Division, Selly Oak, Birmingham 29.
- HOLMES, Wilbur G., M.S., Student of Metallurgy, University of Michigan, Ann Arbor, Mich., U.S.A.
- KIESSEL, William Robert, Instructor, Production Engineering Department, University of Michigan, Ann Arbor, Mich., U.S.A.
- LACEY, Arthur G., Assistant Refinery Manager, Birmingham Battery and Metal Co., Ltd., Selly Oak, Birmingham 29.
- MANN, John Yeates, Technical Officer, Aeronautical Research Laboratories, Department of Supply, Melbourne, Vic., Australia.
- TOBIN, John, Production Supervisor, Johnson, Matthey and Co., Ltd., Hatton Garden, London, E.C.1.

As Student Members

- ALLEN, Steven, B.M.E., S.M., Graduate Student and Research Assistant, Metallurgy Department, Massachusetts Institute of Technology, Cambridge 39, Mass., U.S.A.
- BAGGHI, A. P., M.Sc., Student of Metallurgy, University of Manchester.
- BARA, John A., Jr., Student of Metallurgy, Missouri School of Mines, Rolla, Mo., U.S.A.
- BARDSLEY, Peter Woodhouse, Student of Metallurgy, University of Manchester.
- BASINSKI, Zbignies S., B.A., Research Student, Inorganic Chemistry Laboratory, South Parks Road, Oxford.
- CLARK, Derek Foster, Assistant Metallurgist, Stewarts and Lloyds, Ltd., Corby, Northants.
- DALES, Arthur, Student of Metallurgy, King's College, Newcastle-on-Tyne.
- GASKELL, Philip Darwin, Student of Metallurgy, King's College, Newcastle-on-Tyne.
- HOPKINS, Horace L., Laboratory Assistant, Imperial Chemical Industries, Ltd., Metals Division, Kynoch Works, Witton, Birmingham 6.
- KEITH, Robert Eugene, B.S. (Chem. Eng.), M.S. (Met. Eng.), Graduate Student in Metallurgical Engineering, Engineering Research Institute, University of Michigan, Ann Arbor, Mich., U.S.A.
- LANCASTER, John Darrell, Student of Metallurgy, King's College, Newcastle-on-Tyne.
- LORD, John Anthony, Student of Metallurgy, Rochdale.

- MAVROCORDATOS, D., B.Sc., Post-Graduate Student of Metallurgy, University of Birmingham.
- PAUL, Raymond Wilfred, Student of Metallurgy, Cambridge University.
- SMART, John Bell, Student of Metallurgy, Royal Technical College, Glasgow.
- SMITH, Frederick George, Student of Metallurgy, Royal Technical College, Glasgow.
- SMITH, William B., Student of Metallurgy, Royal Technical College, Glasgow.

PERSONAL NOTES

DR. N. M. DASTUR is now with Ramseyer and Miller, Inc., Consulting Engineers, 11 West 42nd Street, New York 18.

MR. A. M. KEMPSON has retired from the position of Joint Managing Director, Imperial Chemical Industries, Ltd., Metals Division. He had been with the Company for 44 years.

MR. J. W. LENNOX, General Manager of Sintered Products, Ltd., Sutton-in-Ashfield, a Sheepbridge Company, was appointed a Director on 1 January.

MR. F. R. LIDDELL has been appointed General Manager to Berkeley and Co., Ltd., Windsor Street, Birmingham. Mr. Liddell, who was previously an Assistant Technical Officer with Imperial Chemical Industries, Ltd., Metals Division, was recently awarded the B.Sc. degree of London University, with second-class honours in metallurgy, and also the Associateship of the College of Technology, Birmingham.

SIR ANDREW McCANCE has accepted the invitation of the Lord President to become Chairman of the Mechanical Engineering Research Board of the Department of Scientific and Industrial Research, in succession to Sir Henry Guy.

MR. J. D. MCKECHNIE has been appointed Chairman of McKechnie Brothers, Ltd., and will continue as Managing Director of the Company.

MR. J. E. MALAM has been appointed a Director of Murex, Ltd.

MR. B. F. OLDS is now foundry technical assistant with K. and L. Steelfounders and Engineers, Ltd., Letchworth.

MR. A. PINKERTON has retired from the post of Chief Metallurgist of Earle, Bourne and Co., Ltd., after 32 years' service with the Company.

MR. JOHN RAE has retired from the Chairmanship of McKechnie Brothers, Ltd., but remains on the Board of Directors.

MR. C. B. SNODGRASS has been appointed General Manager of Fusarc, Ltd., Gateshead-on-Tyne, and in consequence has relinquished his post as Works Manager of their Associated Company, The Quasi-Arc Co., Ltd.

Deaths

The Editor regrets to announce the death of:

MR. GERALD CHARLES CLAYTON, Manager of the London Office of the Incandescent Group of companies, on 27 December 1951. He had been associated with the Group for 22 years and was a director of Controlled Heat and Air, Ltd.

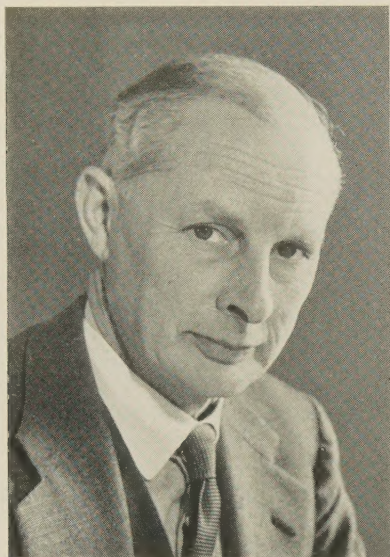
MR. EDWIN JAMES OVERTON in Birmingham on 18 January, at the age of 70. He joined Heaton and Dugard, Ltd., of Birmingham, at the outset of his business career, ultimately becoming Managing Director. When the company was amalgamated with the Delta Metal Company, Ltd., in the 1920s, Mr. Overton became Joint Managing Director.

PERSONALITIES: NEW OFFICERS & MEMBERS OF COUNCIL

Dr. C. J. Smithells**(President)**

Colin James Smithells was born in 1892, educated at Bedales and Leeds University, and in 1914 graduated B.Sc. in Chemistry with First Class Honours. He was an 1851 Exhibitioner, and was awarded the degree of D.Sc. of Leeds University in 1921.

From 1914 to 1918 he served in the 9th Bn. The Gloucester



Regiment and became Second-in-Command, with the rank of Major. He was awarded the Military Cross and was mentioned in despatches.

After the war, in 1919, he joined the Research Staff of The General Electric Company, Ltd., of which he was an original member, and remained there until, in 1938, he took up the post of General Manager to Lodge Plugs, Ltd., Rugby. This post he held until 1944, when he was appointed Director of Research of The British Aluminium Company, Ltd., and established the Research Laboratories at Chalfont Park in Buckinghamshire.

Dr. Smithells' main fields of research have been concerned with tungsten in relation to electric lamps; the physics of lamp manufacture; the development of receiving valves; heat-resisting alloys; gas-metal equilibria; and powder metallurgy, leading to the development of the G.E.C. heavy (tungsten-nickel-copper) alloy. He is the author of seven papers published in the *Journal of the Institute of Metals*, and of papers in the *Proceedings of the Royal Society*, &c.; and also of books on "Tungsten", "Impurities in Metals", and "Gases in Metals". He edited the "Metals Reference Book" published in 1949. He was Cantor Lecturer to the Royal Society of Arts in 1938 and 1950.

Dr. Smithells was elected a member of the Institute of Metals in 1922 and has served on the Council as a Chairman of the London Local Section from 1934 to 1936, and later as an Ordinary Member of Council from 1936 to 1940, and 1945 to 1949, and is a Past-Chairman of the Publication Committee and the Meetings Committee. He is a member of the Iron and Steel Institute, the American Institute of Mining and Metallurgical Engineers, and other scientific and technical societies; President and a Founder Fellow of the Institution of Metal-

lurgists, of which he was Hon. Treasurer 1946-51; a Member of Council of the British Non-Ferrous Metals Research Association, a member of its Research Board and Chairman of the Aluminium and Magnesium Industry Committee; Chairman of the Research Committee of the Aluminium Development Association; and a member of the Inter-Service Metallurgical Research Council. He is a member of the Metals Economy Advisory Committee of the Ministry of Supply, and a Governor of Battersea Polytechnic.

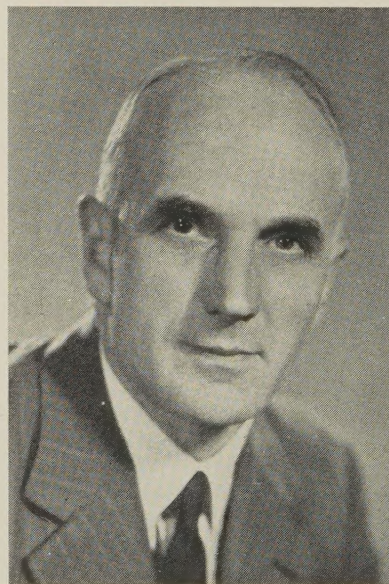
In 1918, Dr. Smithells married Mary, daughter of Professor J. B. Cohen, F.R.S., and has two sons and three daughters. His hobbies are golf, bee-keeping, painting, and making furniture.

Mr. G. L. Bailey**(Vice-President)**

George Leo Bailey was born in 1901 and educated at King Edward VI Grammar School, Five Ways, Birmingham, and at Birmingham University, where he graduated in metallurgy in 1921. He held a Bowen Research Scholarship in the Metallurgy Department at Birmingham in the year 1921-22 and was awarded the degree of M.Sc. in 1922 for his post-graduate research.

In 1922 he joined the staff of the Metallurgical Branch of the Research Department, Woolwich, where he remained until 1930, when he took up a post with the British Non-Ferrous Metals Research Association. He has served with the Association first as Chief Officer of the Development Department, later as Deputy Director, and since November 1944 as Director.

Mr. Bailey's main research work has been in the field of the casting of metals and alloys, particularly in the casting of brass ingots, and he was the joint author with Dr. R. Genders of a monograph on this subject. He has contributed a number of papers to the *Journal of the Institute of Metals*.



He has served on various metallurgical committees of the Ministry of Supply and the Admiralty, and is a member of the Inter-Service Metallurgical Research Council and Chairman of the Non-Ferrous Metals Committee of that Council.

PERSONALITIES

Mr. Bailey was elected a member of the Institute of Metals in 1921 and served as an Ordinary Member of Council from 1940 to 1944, as a Vice-President from 1944 to 1947, as an Honorary Member of Council representing the Institution of Metallurgists from 1947 to 1949, and again as an Ordinary Member of Council since 1950. He was a Founder Member of the Institution of Metallurgists, a Vice-President from 1946 to 1949, and was appointed Honorary Treasurer in 1951. Mr. Bailey was awarded the C.B.E. in the recent New Year Honours List.

Dr. S. F. Dorey
(Vice-President)

Stanley Fabes Dorey was born in 1891, educated at Owen's School, London, and served an apprenticeship at the Royal Dockyard, Chatham. He received his academic training at



Armstrong College (now King's College), Newcastle-on-Tyne, where he attended from 1912 to 1914 with a Whitworth Exhibition and the first Lloyd's Register Scholarship in Marine Engineering to be offered to that College, obtaining the B.Sc. degree, Durham University, with distinction in Marine Engineering.

During the 1914-18 War he served as an Engineer Lieutenant in the Royal Navy.

In 1919, after a few months with Sir W. G. Armstrong Whitworth and Co., Ltd., at Elswick, he was appointed an Engineer and Ship Surveyor to Lloyd's Register of Shipping; after service at a number of ports, he was posted to the staff of the Chief Engineer in 1924, and at the end of 1932 was himself appointed Chief Engineer Surveyor.

Dr. Dorey is a Member of the Mechanical Engineering Research Board, the British Shipbuilding Research Association Board, a Vice-President of the British Internal Combustion Engine Research Association, a Visitor to the British Welding Research Association, and has also served on the Fire Research Board. He is a Past-President of the Institution of Mechanical Engineers and of the Institute of Refrigeration, a Vice-President and Chairman of Council of the Institution of Naval Architects, and is President of the Institute of Marine Engineers and of the Whitworth Society. He has served for a number of years as a member of the Ministry of Labour and National Service Mechanical Engineering Advisory Committee, and as a member of the Home Office Gas Cylinders

Committee. He is a Freeman of the City of London and a Livyman of the Worshipful Company of Shipwrights.

He received the Honour of C.B.E. in 1946, was elected a Fellow of the Royal Society in 1948, and became a Member of Council of that Society in 1950. He has recently been made a Foreign Member of the Danish Academy of Technical Science.

Dr. Dorey has contributed a large number of papers to various technical institutions, including the Parsons Memorial Lecture to the Institute of Marine Engineers in 1942, the Thomas Lowe Gray Lecture to the Institution of Mechanical Engineers in 1941, the Edward Williams Memorial Lecture to the Institute of British Foundrymen in 1943, and the Watt Anniversary Lecture for 1950 to the Greenock Philosophical Society. He has also been honoured by a number of awards from engineering institutions.

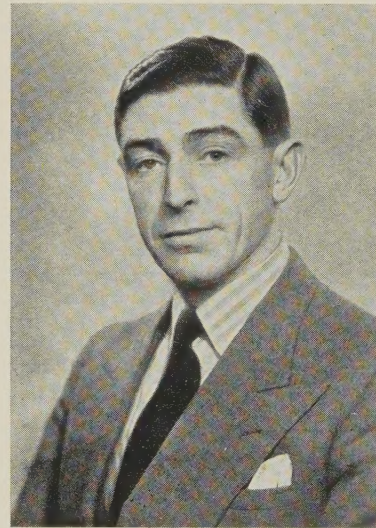
Dr. Dorey was elected a member of the Institute of Metals in 1933. He served as an Ordinary Member of Council from 1936 to 1940 and has previously twice served as Vice-President (1940-43 and 1948-51).

Mr. E. H. Jones
(Honorary Treasurer)

Edward Henry Jones was born in 1902 and was educated at Port Talbot County School and Swansea Technical College.

From 1919 he worked in the Laboratory of Vivian and Sons, Swansea, and in 1925 joined Capper Pass and Son, Ltd., becoming Works Manager of the Bristol Works in 1938 and a Director of the Company in 1943.

He was elected a Member of the Institute of Metals in 1946. He has been a Member of Council since 1950, and has served



on the Local Sections Committee and on the Publication Committee.

Dr. N. P. Inglis
(Ordinary Member of Council)

Norman Peter Inglis was born in 1902. After graduating with First Class Honours from the University of Liverpool, he carried out research there on the fatigue of metals and later continued this work at the University of Illinois, Urbana, U.S.A., under Professor H. F. Moore.

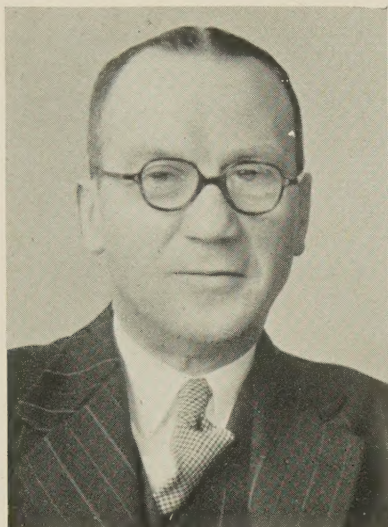
On returning to England in 1927, he was appointed to

PERSONALITIES

Synthetic Ammonia and Nitrates, Ltd. (now the Billingham Division of Imperial Chemical Industries, Ltd.) and was in charge of the metallurgical section at Billingham from 1928 to 1938. In 1938 he was appointed Engineering Research Manager of the Billingham Division of I.C.I. and continued in that post until December, 1950. He was appointed a Director of the Metals Division of Imperial Chemical Industries, Ltd., in 1947 and became Research Director of that Division in January 1951.

Dr. Inglis is a member of the Institution of Mechanical Engineers and a Vice-President of the Institution of Metal-

electrical engineering industry, which have appeared in the journals of several societies. In 1947 he was awarded (jointly



lurgists, on whose Council he has served for the past four years. He has been a member of the Institute of Metals since 1928.

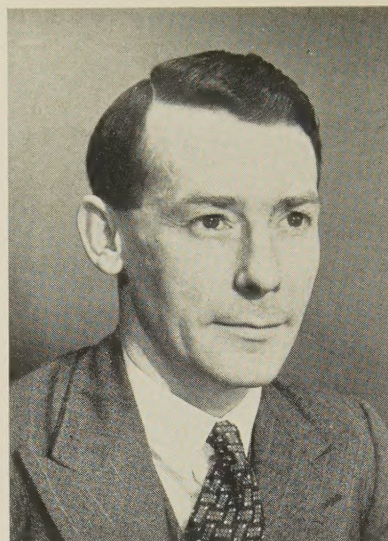
Dr. Ivor Jenkins

(Ordinary Member of Council)

Ivor Jenkins was born in 1913 and educated at the Secondary School, Gowerton, and the University College of Wales, Swansea, where, as a Folland Scholar, he studied under Professor C. A. Edwards, gaining a B.Sc. degree with First Class Honours in Metallurgy in 1934. Subsequently he received the M.Sc. (1938) and D.Sc. (1948) degrees of the University of Wales.

In 1934 he went to the Research Laboratories of The General Electric Co., Ltd., Wembley, with an 1851 Industrial Bursary, to work under Dr. C. J. Smithells, and in 1936 he became a member of the scientific staff of the Laboratories. After leaving there for a time in 1944-45 to assist in the establishment of a new Research Laboratory for the Whitehead Iron and Steel Co., Ltd., Newport, Mon., Dr. Jenkins returned to the G.E.C. and in 1946 succeeded the late Mr. S. V. Williams as head of the Metallurgy Department. In the following year he became a member of the Leading Scientific Staff of the Laboratories.

Dr. Jenkins is a member of the Metals Economy Committee of the Ministry of Supply, and of various committees of the Inter-Service Metallurgical Research Council, British Non-Ferrous Metals Research Association, British Cast Iron Research Association, and Institute of British Foundrymen. His publications include a book on "Controlled Atmospheres for the Heat-Treatment of Metals" (1946) and numerous papers on general metallurgical problems associated with the



with Dr. B. Jones) the Williams Prize of the Iron and Steel Institute.

Dr. Jenkins has been a member of the Institute of Metals since 1932 and has served on the Publication Committee for the past three years.

Dr. A. G. Ramsay

(Ordinary Member of Council)

Alexander Gray Ramsay was born in 1902 and educated at Liverpool University where he gained a B.Sc. degree with Honours in Chemistry in 1921. After two years' research at the University, he was awarded a Ph.D. degree. On leaving the University in 1923, he was appointed a chemist with Lever Bros., Ltd., Port Sunlight.



In 1925 Dr. Ramsay joined British Copper Manufacturers, Ltd., Swansea, as a research assistant. Shortly after the merger of this firm into I.C.I. Metals, Ltd., he was appointed

PERSONALITIES

Chief Metallurgist of the Swansea Works, and in 1932, General Works Manager. Four years later he transferred to Birmingham on appointment as Deputy Production Manager, I.C.I. Metals, Ltd., and later became Joint Production Manager and Director of Fyfe and Co., Ltd., Dundee, and Director, Scottish Non-Ferrous Tube Industries, Ltd., Glasgow. In 1946 he joined The Mond Nickel Co., Ltd., as Manager of their Clydach Refinery, and in 1951 he was appointed a Director of that Company.

Dr. Ramsay is at present Chairman of the South Wales Section of the Royal Institute of Chemistry and of the South Wales Section of the Society of Chemical Industry. He has been a member of the Institute of Metals since 1925.

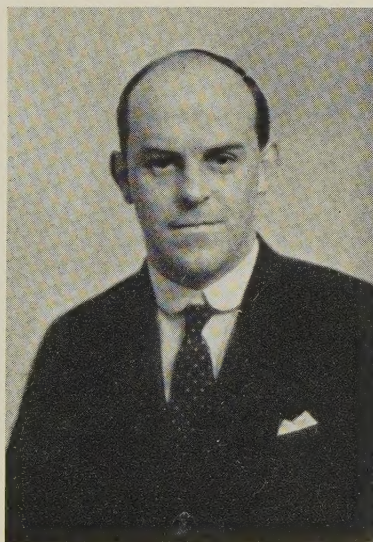
Dr. H. Sutton

(Ordinary Member of Council)

Hubert Sutton was born in 1894 and educated at King Edward VI Grammar School, Macclesfield, and Manchester University, where he gained a B.Sc. degree with Honours in Chemistry, M.Sc. in Metallurgy, and D.Sc. From 1915 to 1918 he worked at Manchester, under Professor C. A. Edwards, for the Ministry of Munitions and also undertook part-time research on chromium steels.

Dr. Sutton joined the Metallurgical Department, Royal Aircraft Establishment, Farnborough, in 1918 and became Head of the Department in 1925. In 1943 he was appointed Assistant Director, Research and Development, Metallic Materials, Ministry of Aircraft Production; in 1946, Deputy Director, Aircraft Research and Development (Materials), Ministry of Supply; and in 1950 Director, Materials Research and Development (Air), Ministry of Supply. His subjects of research include chromium steels, surface treatments of metals for protection against corrosion, fatigue and corrosion-fatigue as influenced by surface treatments, nitriding, &c., and light alloys, and he is author or joint author of numerous papers in the scientific and technical Press.

Dr. Sutton is a member of the Welding Research Board and of the Research Board of the British Non-Ferrous Metals Research Association and of a number of committees of the



British Iron and Steel, British Non-Ferrous Metals, and British Welding Research Associations. He is a Fellow and Simms Gold Medallist of the Royal Aeronautical Society, a Fellow

of the Institution of Metallurgists, and a member of several scientific societies. He was elected a member of the Institute in 1918 and previously served on the Council from 1941 to 1945.

Major P. Litherland Teed

(Ordinary Member of Council)

Philip Litherland Teed was born in 1889, and educated at Dulwich College and the Royal School of Mines. He served in the First World War in the Royal Naval Air Service and



Royal Air Force in France and other areas. Subsequently he became Head of the Gas and Chemistry Section of the Inter-Allied Aeronautical Commission of Control (Germany).

Major Teed joined the Vickers Group in 1924 and is now Deputy Chief of Research and Development, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge. During the Second World War he served first as Deputy Director of Material Production in the Ministry of Aircraft Production, and subsequently as Metallurgical Adviser to the Minister of Production, and to the British Commonwealth Scientific Office in Washington.

In 1949 Major Teed was invited to lecture at the International Aeronautical Conference in New York on "Materials from the Aircraft Manufacturers' Point of View", and in 1950, at the Massachusetts Institute of Technology, he lectured on "The Influence of Metallographic Structure on Fatigue". Last year he was a member of an eight-man team which went to the United States under the auspices of the Anglo-American Council on Productivity to study and report on the conservation of strategic metals.

His publications include "The Chemistry and Manufacture of Hydrogen", "Duralumin and Its Heat-Treatment", "Anglo-American Magnesium Production", "The Properties of Metallic Materials at Low Temperatures", and papers dealing with the chemistry and/or physics of materials.

Major Teed is an Associate of the Royal School of Mines in Mining and Metallurgy, a Barrister-at-Law (Middle Temple), a Member of the Institution of Mining and Metallurgy, a Fellow of the Physical Society, and a Fellow of the Royal Aeronautical Society. He joined the Institute of Metals in 1931.

Mr. W. J. Thomas

(Ordinary Member of Council)

William John Thomas was born in 1894 and received his preliminary engineering training as a pupil to engineering consultants, with technical training at Cardiff Technical College and later at the Herriot-Watt College, Edinburgh. He subsequently extended his experience in various engineering posts with Baldwins, Ltd., Cammell-Laird and Co., Ltd., Vickers, Ltd., and Metropolitan-Vickers Electrical Co., Ltd.

Mr. Thomas joined The British Aluminium Co., Ltd., in 1924 as an Assistant Engineer in their Head Office, and has since occupied the positions of Works Manager, Technical



Manager, and General Production Manager. He is now the Assistant Managing Director of the Company and also a director of several subsidiary companies in Britain and overseas.

Mr. Thomas is a member of the Institution of Electrical Engineers and the Institution of Mechanical Engineers, and he and one of his colleagues were joint recipients of the first award of the W. H. A. Robertson Medal by the Institute of Metals, for a paper on "Some Technical Problems Influencing Production Economy in the Rolling of Aluminium". He has been a member of the Institute since 1926.

OBITUARY

Mr. A. W. Hothersall

Mr. A. W. Hothersall, M.Sc. Tech., F.I.M., died on 20 October 1951 at the age of 55.

Arthur Wesley Hothersall was born at Mytholmroyd, Yorkshire, and was educated at Kingswood School, Bath, and Manchester College of Technology. He graduated from there in 1915 with First Class Honours in Applied Chemistry (Metallurgy) and his next six years were spent with High Speed Steel Alloys, Ltd., first at their Widnes works and later at their plant at Tavoy in Burma. In 1921 Mr. Hothersall joined the staff of the Research Department, Woolwich, and was for a time personal assistant to the then Director of Metallurgical Research (Dr. Harold Moore). Later he was associated with Dr. D. J. Macnaughtan in the development of a special section at Woolwich to deal with problems of

electrodeposition and corrosion, and in 1933 he became head of the section. Under his leadership the section enjoyed a high reputation and carried out much work on the application of electrodeposition to armaments and on the protection of Service stores from corrosion.

Mr. Hothersall's own interest lay especially in the mechanical and physical properties of deposited metals and in the structure and adhesion of electrodeposits. He made numerous contributions to knowledge in these fields, and he was the author or joint author of about forty papers published by various societies, particularly the Electrodepositors' Technical Society, of which he was a founder-member and President in 1937-39. He was awarded the Society's Gold Medal in 1950 for distinguished service to electrodeposition.

Mr. Hothersall was promoted to Senior Principal Scientific Officer at Woolwich in 1948 and later to Senior Superintendent with the rank of Deputy Chief Scientific Officer. He had been a member of the Institute of Metals since 1933 and had for a number of years reviewed books on electrodeposition for *Metallurgical Abstracts*.

LETTER TO THE EDITOR

On the Existence of Two Kinds of Yield Point

It is well established that the magnitude of the yield-point extension in mild steel, as annealed, is strongly dependent on the grain-size and becomes larger as the crystal size becomes smaller; in single crystals which have received no deformation after preparation, yield-point effects are weak or absent.¹⁻⁴ In contrast to this behaviour with regard to the initial yield point, single crystals, like polycrystalline material, develop a well-marked yield point after slight straining followed by ageing. However, it has commonly been assumed, e.g. in the original form of the Cottrell theory,⁵ that both the initial yield point and that developed by strain-ageing are due to essentially the same cause.

The writers' experiments on aluminium alloys, an account of which is at present being prepared for publication, have led them to infer that two kinds of yield-point phenomenon may occur. The first, a grain-boundary phenomenon, is held to be responsible for the initial yield point in an annealed fine-grained material; the second, taking place within the grains, is held to cause the development of a yield point, whether in coarse- or fine-grained material, after straining and ageing, but does not give rise to an initial yield point in an annealed material. In these alloys the ageing is rapid at room temperature, so that the second phenomenon produces multiple discontinuous yielding (the Portevin-Le Chatelier effect) in a tensile test at room temperature. We refer to the corresponding yield points and surface markings as Type A and Type B, respectively. Straining and ageing have not, in our experiments, produced any appreciable return of the Type A yield.

We visualize the grain-boundary phenomenon as one giving rise to a barrier to slip. Cottrell has discussed a yield-point mechanism postulating such a barrier,⁶ it being supposed that slip is initiated by the breaking free of pre-existing dislocations within the grains under a quite low applied stress aided by stress concentrations, but that these dislocations are held up at grain boundaries so that only limited slip can occur until the grain-boundary barrier has been overcome. Other related mechanisms might be suggested, involving the generation of dislocations under stress at special sources; for instance, dislocations generated by the stress at sources on the free

surface could allow some plastic relaxation in the grains lying in the surface, but general yielding could not occur until the slip motions in these grains had been propagated across the grain-boundary barrier into the grains which had no free surface.

If our conclusions are applicable to mild steel, the dependence of the initial yield point in the annealed metal on grain-size, including the absence of a yield point in a good single crystal, is presumably to be expected. The occurrence of a yield point on strain-ageing, irrespective of whether the metal is a single crystal or not, is also an expected result.

To test the validity of the barrier hypothesis, some hardness measurements have been made on mild steel, as in this metal the increase in hardness due to the development of a yield point is considerable. Comparisons have been made between the hardness measured by the standard Vickers machine (10 kg. load), the impressions of which covered many grains, and the hardness measured on individual grains by the microhardness tester (17 g. load) described by Perryman.⁷ For a simple material such as pure annealed copper or aluminium, the two instruments give the same average hardness number on a work-free surface provided sufficient grains are tested, there being significant differences from grain to grain (of differing orientations). The microhardness tester should give a hardness figure uncomplicated by the grain-boundary barrier, slip being readily initiated under the point of the indenter during loading. With the Vickers machine, however, it is necessary to propagate slip into many grains, and in the presence of a grain-boundary barrier the hardness obtained will be higher.

The steel examined was deep-drawing-quality strip, which after cold rolling had been annealed just below the lower critical temperature and had received no subsequent working. Its analysis was as follows: C 0.059, N 0.13, O 0.04, P 0.009, S 0.017, Mn 0.31, Cu 0.068%, Ni a trace; Al and Si were not detected spectrographically. The grain-size was 0.023 mm., and a small quantity of cementite was visible in the microstructure. The yield-point elongation was 4%.

The results of hardness measurements on the annealed metal and the effects of stretching (approximately 6 or 10%) and ageing on the hardness are given in Table A. Some delay

to the time involved in taking the readings themselves. Accordingly, the procedure adopted was to hand-polish a strip, stretch, measure the Vickers hardness, electropolish, measure the microhardness, and finally measure the Vickers hardness again. Ageing was then carried out and the hardness measurements repeated.

The results on specimen 2a indicate that when the steel has been stretched through the yield point, the results obtained with the two instruments are closely concordant, and the agreement is maintained on ageing (specimens 2b and 4), showing that there is then for this steel no appreciable grain-boundary effect and that the hardening associated with the new yield point formed on strain-ageing takes place throughout the grains, as originally assumed by Cottrell.⁵ On the other hand, the annealed metal (specimen 1) shows a marked difference between the microhardness and the Vickers hardness, indicating the presence of a grain-boundary barrier.

British Non-Ferrous Metals Research
Association, London.

R. EBORALL
MARY LACK
V. A. PHILLIPS.

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5. A. H. Cottrell, *Phys. Soc.: Rep. Conf. on Strength of Solids*, 1948, 30.
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7. E. C. W. Perryman, *Metal Ind.*, 1950, **76**, 23.

JOINT ACTIVITIES

Fifth Empire Mining and Metallurgical Congress

The Empire Council of Mining and Metallurgical Institutions, of which the Institute of Metals is a constituent body, announces that the Fifth Empire Mining and Metallurgical Congress will be held in Australia and New Zealand during April and May 1953.

The chief object of the Congress is to afford an opportunity for mining engineers, metallurgists, engineers, and others concerned with the mining and metallurgical industries to meet and discuss technical progress and problems, including the mineral resources of the British Commonwealth of Nations. Anyone interested in the subjects to be discussed, irrespective of nationality, may apply for membership of the Congress.

The principal technical sessions will take place in Melbourne and Sydney, and there will be a series of visits to various mining areas of Australia and New Zealand.

Copies of a circular giving preliminary details may be obtained from the Secretary of the Institute of Metals.

NEWS OF LOCAL SECTIONS AND ASSOCIATED SOCIETIES

Oxford Local Section

DR. J. THEWLIS, Head of the Diffraction Branch, Atomic Energy Research Establishment, Harwell, gave a lecture to the Oxford Local Section on 15 January 1952, on the subject of:

TABLE A

Specimen	Condition	Mean Microhardness (V.P.N.) (20 different crystals) *	Vickers Hardness No. (V.P.N.)
1	As annealed.	73 ± 1.5	92
2a	Stretched 6%, tested immediately.	—	111
	Same, tested 1½–4½ hr. after stretching.	116 ± 1.7	—
	Same, tested 4½ hr. after stretching.	—	119
2b	Another specimen from same stretched strip. Aged at 100° C. for 32 hr.	126 ± 1.5	126
3	Stretched 10.8%, tested immediately.	—	116
4	Stretched 9.8%, aged approx. 30 hr. at room temperature.	142 ± 3.3	142

* The limits given are the estimated standard deviations of the mean value given by: standard deviation for single measurement/√(No. of measurements).

was inevitable between stretching and taking microhardness measurements, owing to the prolonged electropolishing which is required before a true measurement can be obtained and

Neutron Diffraction, with Reference to Its Metallurgical Applications

The lecturer began by saying that this was one of the good things which had come out of the development of atomic energy. It had been realized some years ago that neutrons should theoretically be capable of being diffracted by crystals in the same manner as X-rays and electrons. It was not until the development of atomic piles, however, that a suitable source of neutrons for this purpose was available. The wave-lengths of the thermal neutrons are of the order of 1 Å., which are comparable with the X-ray wave-lengths used for diffraction.

The audience was reminded of the principles of X-ray diffraction and the basic laws of crystal analysis. The diffraction of neutrons and X-rays by crystals was then compared. The absorption of neutrons by elements is very much less than their absorption of X-rays, with the exception of lithium, boron, cadmium, and gadolinium. The curve of scattering factor against $\sin \theta/\lambda$, which is a steadily falling curve for X-rays, is a straight line for neutrons. For neutrons the mass-absorption coefficient does not vary regularly with atomic number as it does for X-rays.

The type of spectrometer used was described. To obtain a sufficiently high intensity, the neutron beam is large compared with that used in X-ray work. As a result, the spectrometer is large, that at Harwell being 6 ft. high and weighing several tons.

Neutron diffraction should be used to supplement the results obtained by X-ray diffraction. The earliest applications were to discover the positions of hydrogen atoms in compounds, principally sodium hydride, ice, and ammonium chloride. In the metallurgical field the existence of superlattice lines has been shown in ordered alloys, such as FeCo and Ni₃Mn, which failed to produce superlattice lines with X-rays, owing to the similar scattering powers of the elements concerned. The preferential orientation of aluminium, the structure of liquid metals, and the behaviour of antiferromagnetic materials have all been investigated by means of neutron-diffraction techniques.

Sheffield Local Section

On 5 February a joint meeting with the Sheffield Metallurgical Association took place at the Grand Hotel, Sheffield, at which Dr. E. SCHEUER, Chief Metallurgist, International Alloys, Ltd., Aylesbury, gave a lecture on:

Casting of Billets, with Special Reference to Continuous Casting

Dr. Scheuer said that in the older billet-casting processes the temperature distribution and shape of the solidification zone changed continuously during the whole period of solidification. The basic feature of the modern billet-casting processes was the stationary condition of the temperature distribution and consequently the surface separating liquid and solid metal in the solidification zone.

The structural features of an ideal billet were: absence of separations and inclusions of all kinds; uniform composition; fine and uniform distribution of the dispersed phases; small grain-size of the matrix; and clean and smooth surface. To achieve this structure the ideal billet-casting process would have to possess the following features: filling of the mould without turbulence; low pouring temperature; rapid heat extraction; directional solidification; and plane solidification front.

Consideration of the conventional and the continuous-casting processes showed that the latter produced conditions which offered a decidedly better opportunity of achieving all these features. Fortunately, this metallurgically superior process was also a satisfactory solution from the engineering and production points of view. It allowed rigid quantitative control of all important operating conditions and rapid production on a limited floor space.

A number of well-designed machines had been developed on the principle of the billet moving down a sleeve-shaped mould with appropriate cooling in and below the mould. Some of these machines worked on the fully continuous principle, producing an endless billet which was cut into convenient lengths by a flying cutter. In others the casting process was stopped when a convenient length had been produced (about 8–20 ft.) and restarted after this had been removed (semi-continuous casting).

A second type of machine, in which the mould was formed by a pair of rollers or belts that travelled with the billets until at least a solid shell had been formed, was still in the experimental stage as far as larger sections and sheet strip were concerned, but small rod for wire drawing was being produced industrially.

In the aluminium and magnesium industries continuous casting had practically superseded the conventional billet-casting processes, with favourable results both in quality and output.

In the field of copper alloys, continuously cast brass was being produced on a large scale, and bronze rod and tubular sections were produced industrially in high-quality materials. In the production of other copper alloys, pure copper, nickel alloys, and steels, large-scale experiments or pilot plants were in operation, and seemed to be meeting with encouraging success.

The main limitations in the application of the process related to large billets or very hot-short alloys. Difficulties in these cases were caused by severe internal stresses which occurred during and after solidification and produced cracks.

At a joint meeting with the Sheffield Society of Engineers and Metallurgists to be held in the Mappin Hall, The University, St. George's Square, Sheffield 1, at 7.30 p.m. on 17 March, Mr. R. T. ROLFE, O.B.E., Chief Metallurgist of W. H. Allen, Sons and Co., Ltd., Bedford, will give a lecture on:

Bearings and Bearing Alloys

Points to be dealt with include the following:

Purposes of lubricating a bearing; viscous lubrication; conditions on starting or stopping; boundary lubrication and what it involves; "oiliness" of a lubricant; effect of additions to lubricating oils; changes from viscous to boundary lubrication in a plain bearing and the effect on the coefficient of friction; metal-to-metal contact and the "stick-slip" effect; practical considerations deciding whether the lubrication is of fluid-film or of boundary type in bearings of different types; use of "Oildag" and its effect in cases of static and kinetic friction.

The duties of bearings (pressures, speed, and conditions in general) in steam turbines, gears and epicyclic gears, Diesel engines, gas turbines, and rolling mills.

The requirements of a bearing alloy in general; the "balancing" of properties; composite nature of bearing alloys in general; and the validity of the "hard speck" theory.

Tin-base bearing alloys: the effect of various constituents,

particularly that of copper; typical alloys, their varying mechanical properties and service behaviour; comparison with lead-base alloys (manufacture, mechanical quality, thermal quality, and relative wear); reasons guiding the selection of alloys for different duties.

White metal bearing failures due to fatigue, wiping, the machining in the bearing shell of serrations which act as stress-raisers, &c.

Copper-lead alloys (manufacture, structure, uses and performance); copper-tin alloys; phosphor bronzes; aluminium-, zinc-, cadmium-, silver-base and other bearing alloys.

Detailed procedure for the lining of bearing shells of gun-metal, steel, and cast iron; the importance of tinning; difficulty of tinning cast iron; recommended thicknesses of white metal for various duties; bi-metal and tri-metal bearings, &c.

South Wales Local Section

The annual general meeting of the Section, originally arranged for 25 March, will now be held on 18 March. The programme is unchanged.

At a meeting of the Section held at University College, Swansea, on 15 January, and attended by the President and Secretary of the Institute, Mr. T. HENRY TURNER, Superintendent of the Metallurgy Division of the Railway Executive, gave a lecture on:

Metallurgy and Transport

Mr. Turner began with an historical survey of the development of transport from the earliest times to the present day. Modern land, sea, and air transport all rely on the extensive use of metals, and large quantities of metal pipes are used for the transport of water, oil, and natural and other gases.

But while metals were essential to transport, metallurgical industry as it exists today is very largely dependent on transport facilities, for ores often occur in remote parts of the world. A new railway was now under construction to make available to American industry rich iron-ore deposits that had been discovered in the far north of Canada.

The lecturer then turned to deal in greater detail with the use of metals in rail transport. He said that British Railways were the best customer of many metallurgical industries, and they had suffered seriously from the recent abnormal increases in cost of metals; they are big consumers of steel for rails (250,000 tons a year), for carriages (25 a week), and for wagons, as well as of non-ferrous metals and alloys.

NEWS OF KINDRED SOCIETIES

Institution of Metallurgists Examinations

The next examinations for the Licentiate and Associateship of the Institution of Metallurgists will be held from 25 August to 2 September 1952. Candidates must submit their applications for permission to enter the examinations before 1 May 1952 (overseas 1 April 1952).

Each application must be made on a form to be obtained from the Registrar-Secretary of the Institution, 4 Grosvenor Gardens, London, S.W.1, and must be accompanied by a registration fee of one guinea.

Examinations for the Fellowship will also be held between 25 August and 2 September 1952, and intending candidates should apply for permission to enter for the examination, submitting, for the approval of the Council, a statement of

the branch of metallurgy in which they offer themselves for examination.

Institute of Physics X-Ray Analysis Group

The Spring Conference of the X-Ray Analysis Group of the Institute of Physics is being held this year in conjunction with the Scottish Branch of that Institute and will take place in the Chemistry Department, King's Building, Edinburgh 9, on 3-5 April 1952. It is open to all without charge.

A number of topics of interest to metallurgists appear in the programme, details of which may be obtained from the Honorary Conference Secretary, Mr. E. G. Steward, Research Laboratories of The General Electric Co., Ltd., Wembley, Middlesex.

Physical Society Exhibition

The Physical Society's 36th Annual Exhibition of Scientific Instruments and Apparatus will be held from Thursday, 3 April, to Tuesday, 8 April 1952, excluding Sunday.

As in 1951, the Exhibition will be located in both the Royal College of Science main building, Imperial Institute Road, S.W.7, and the Huxley Building, Exhibition Road, S.W.7, a representative selection being exhibited in each building. Tickets will be valid for entry into both buildings.

As the importance of British science as a national asset is being increasingly recognized, much new equipment has been designed for pure and applied research laboratories and all types of equipment are on view in the Huxley Building and the Royal College of Science.

The Handbook of the Exhibition containing the description of exhibits will be available from the Physical Society early in March, price 7s. 3d., including postage.

OTHER NEWS

International Council for Electrodeposition

The Institute of Metal Finishing, in conjunction with the American Electroplaters' Society, announces the formation of the International Council for Electrodeposition.

The object of the Council is to initiate and co-ordinate all activities of member Societies where international action is necessary or desirable. Such activities may include the holding of international functions, questions of nomenclature and terminology, and the representation of the interests of electrodeposition on international bodies.

Representation on the Council is initially confined to the Institute of Metal Finishing and the American Electroplaters' Society. Membership of the Council is, however, open to any Society one of whose main interests is the subject of electrodeposition.

The headquarters of the International Council are 27 Islington High Street, London, N.1., and the Honorary Officers are: *Chairman*: Mr. H. Silman (President, Institute of Metal Finishing); *Hon. Corresponding Secretary*: Dr. S. Wernick (Hon. Secretary, Institute of Metal Finishing); and Dr. W. R. Meyer and Mr. W. L. Pinner (American Electroplaters' Society).

International Institution for Production Engineering Research

The considerable development which is taking place in production-engineering techniques, the urgent necessity for eliminating empiricism and for placing production methods on a scientific and theoretical basis, and the existence of a multitude of production problems, have led to the formation

of the International Institution for Production Engineering Research by European investigators who are working in this field. The aims of the Institution are: (1) To promote scientific research into the mechanical working of all solid materials; (2) To establish permanent contact between investigators by comparing research programmes and exchanging experimental results; and (3) To convene conferences to consolidate research results and ensure their publication.

The titular members of the Institution are limited in number, and are elected from research workers who have distinguished themselves in the field of machining of materials. Preference is given to those who are directing or have directed a research laboratory. The Institution will each year decide the number of titular members, the date of the presentation of candidates, the conditions of election, and the geographical distribution of members.

The General Secretary of the Institution is Engineer General P. Nicolau and its address 233 Boulevard Raspail, Paris (14e).

Information in Industry

Much of the success of the drive for industrial productivity depends on the speedy provision of accurate information in the scientific and industrial fields. Recognizing this fact, the Department of Scientific and Industrial Research has recently made available to Aslib a special grant to establish a Consultant Service in the special-library and information field.

This service, drawing upon the existing resources of Aslib, and backed by new research into information techniques, is now available to advise those who are considering the establishment of special libraries and information services in industry and research establishments, and to assist the development of existing services. Details regarding this Service and other facilities provided by Aslib can be obtained from the Director, Aslib, 4 Palace Gate, London, W.8.

The Measurement and Importance of the Elastic Properties of Metals

As already announced in the February *Bulletin*, an informal Conference has been arranged at the National Physical Laboratory on 20-21 March 1952 on the above subject. It will be limited to about 100 invited members. The programme is as follows:

Thursday, 20 March: Dr. E. C. Bullard, "Introduction"; A. F. C. Brown, "Static Measurement of Very Small Strains"; G. Bradfield, "Medium- and High-Frequency Measurements of Elasticity"; Dr. E. G. Stanford, "Variations of Young's Modulus of Aluminium Alloys with Temperature (Low-Frequency Methods)"; Professor N. F. Mott, "Elastic Constants: A Survey of the Theory, with Special Reference to Lattice Defects"; — Pursey, T. H. Schofield, and D. McLean, "Elastic-Constant Measurements on Some Alloys".

Friday, 21 March: Professor H. Jones, "Theory of the Elastic Constants of Metallic Crystals"; Dr. W. A. Wooster, "Diffuse X-Ray Reflections of Crystals in Relation to Their Elasticity and Structure"; Dr. R. S. Leigh, "Relations between Elastic Constants and Phase Boundaries in Alloys"; Professor C. S. Barrett, "After-Effects of Normal and Abnormal Types in Metals"; H. L. Cox, "Analogies Between the Behaviour of Structures and the Behaviour of Materials".

Members of the Institute of Metals who would be interested in receiving an invitation are asked to write to the Secretary, National Physical Laboratory, Teddington, Middlesex.

DIARY

The Institute

24 March. Forty-Second Annual May Lecture by Dr. J. J. P. Staudinger on "The Place of Plastics in the Order of Matter". (Royal Institution, Albemarle Street, W.1, at 6.0 p.m.)

25-27 March. Forty-Fourth Annual General Meeting. For full details, see February issue of the *Bulletin*, pp. 37-38.

Local Sections

4 March. South Wales. "The Direct-Reading Spectrograph", by R. T. Staples. (Metallurgy Department, University College, Singleton Park, Swansea, at 6.30 p.m.)

6 March. Birmingham. "The Steel Company of Wales", by W. F. Cartwright. (James Watt Memorial Institute, Great Charles Street, Birmingham 3, at 6.30 p.m.)

6 March. London. "The Metallurgical Problems Arising from Stratospheric Flight", by Major P. L. Teed. (4 Grosvenor Gardens, London, S.W.1, at 7.0 p.m.)

10 March. Scottish. Annual General Meeting (39 Elmbank Crescent, Glasgow, C.2, at 6.30 p.m.)

11 March. Oxford. "Transformations in Metals", by Professor C. S. Barrett. (Black Hall, St. Giles, Oxford, at 7.0 p.m.)

17 March. Sheffield. Annual General Meeting, followed by "Bearings and Bearing Alloys", by R. T. Rolfe. Joint Meeting with the Sheffield Society of Engineers and Metallurgists. (The University, St. George's Square, Sheffield 1, at 7.30 p.m.)

[For Synopsis of this lecture, see p. 60.]

18 March. South Wales. Annual General Meeting, followed by films of metallurgical interest. (Metallurgy Department, University College, Singleton Park, Swansea, at 6.30 p.m.)

27 March. Birmingham. "Extrusion", by Christopher Smith. (James Watt Memorial Institute, Great Charles Street, Birmingham 3, at 6.30 p.m.)

Other Societies

4 March. Institute of Metal Finishing, Midlands Centre. "Economic Aspects of Metal in Industry", by Professor A. J. Murphy. (James Watt Memorial Institute, Great Charles Street, Birmingham 3, at 6.30 p.m.)

5 March. Manchester Metallurgical Society. "The Surface Structure and Friction of Metals", by Dr. A. J. W. Moore. (Engineers' Club, Albert Square, Manchester, at 6.30 p.m.)

6 March. Institution of Heating and Ventilating Engineers, Birmingham and District Branch. Film Evening: "Copper Tube and Fittings—Maintenance and Installation". (Imperial Hotel, Birmingham, at 6.30 p.m.)

6 March. Leeds Metallurgical Society. "Recent Research on Aluminium and Its Alloys", by D. C. G. Lees. (Chemistry Department, The University, Leeds 2, at 7.0 p.m.)

8 March. Institute of British Foundrymen, Newcastle Branch. "Repair and Reclamation of Non-Ferrous Castings—Report of Sub-Committee T.S. 26", by G. Elston. (Neville Hall, Newcastle-on-Tyne, at 6.0 p.m.)

8 March. Institute of British Foundrymen, West Riding of Yorkshire Branch. "A System of Studying Casting Defects", by G. W. Nicholls and D. T. Kershaw. (Technical College, Bradford, at 6.30 p.m.)

APPOINTMENTS VACANT

- 12 March. **Institute of British Foundrymen, Lancashire Branch.** "A System of Studying Casting Defects", by G. W. Nicholls and D. T. Kershaw. (Engineers' Club, Albert Square, Manchester, at 7.0 p.m.)
- 14 March. **Chemical Society, South Wales Section.** "The Combination of Metals and Non-Metals", by Dr. U. R. Evans. Joint Meeting with the Royal Institute of Chemistry and University College of Swansea Chemical Society. (Chemistry Department, University College, Swansea, at 5.30 p.m.)
- 14 March. **Society of Chemical Industry, Corrosion Group.** Papers on Protective Coatings under Conditions of Atmospheric Corrosion. Joint Meeting with Association Belge pour l'Etude, l'Essai et l'Emploi des Matériaux. (4 Grosvenor Gardens, London, S.W.1, at 10.0 a.m. and 2.30 p.m.)
- 17 March. **Institute of Metal Finishing, London Centre.** "The Problem of Hydrogen Diffusion in the Pickling of Spring Steel", by J. S. Jackson. (Northampton Polytechnic, St. John Street, London, E.C.1, at 6.0 p.m.)
- 18 March. **Institute of British Foundrymen, East Anglian Section.** Discussion on Feeding Techniques. (Public Library, Ipswich, at 7.0 p.m.)
- 19 March. **Institution of Locomotive Engineers.** "The Application of Welding to Locomotive Copper Fireboxes", by Mr. J. F. Harrison. (Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1, at 5.30 p.m.)
- 19 March. **Manchester Metallurgical Society.** Visit to John Summers and Sons, Ltd., Shotton, Chester.
- 20 March. **Institution of Mining and Metallurgy.** "New Methods in the Statistical Evaluation of Mine Sampling Data", by H. S. Sichel. (Geological Society, Burlington House, Piccadilly, London, W.1, at 5.0 p.m.)
- 21 March. **Liverpool Metallurgical Society.** "Recent Researches on the Mechanism of Solidification in Castings", by R. W. Ruddle. (Lecture Theatre, Electricity Service Centre, Whitechapel, Liverpool, at 7.0 p.m.)
- 21 March. **North-East Coast Institution of Engineers and Shipbuilders.** "Modern Foundry Practice", by T. W. Bushell. (Mining Institute, Neville Hall, Newcastle-on-Tyne, at 6.15 p.m.)
- 21 March. **West of Scotland Iron and Steel Institute.** Short papers by members. (39 Elmbank Crescent, Glasgow, C.2, at 6.45 p.m.)
- 25 March. **Institute of British Foundrymen, Slough Section.** Film and talk on "Die-Casting in the U.S.A.", by C. J. Williams. (Lecture Theatre, High Duty Alloys, Ltd., Slough, at 7.30 p.m.)
- 26 March. **Institute of British Foundrymen, Birmingham Branch.** "Recent Developments in Foundry Mechanization", by A. S. Beech. (James Watt Memorial Institute, Great Charles Street, Birmingham 3, at 7.15 p.m.)
- 26 March. **Institute of British Foundrymen, London Branch.** "The Buyer's Point of View", by J. F. Kayser. Joint meeting with the Purchasing Officers' Association. (Waldorf Hotel, Aldwych, London, W.C.2, at 7.30 p.m.)

28 March. **Institute of Metal Finishing, Sheffield and North-East Centre.** Paper by E. A. Ollard, subject to be announced. (Grand Hotel, Sheffield, at 6.30 p.m.)

APPOINTMENTS VACANT

ASSISTANT CHEMIST required for the analysis of copper- and nickel-base alloys, and stainless steel. Knowledge of spectrographic analysis an advantage. Salary according to age, qualifications, and experience. Applications to Personnel Department, Langley Alloys Ltd., Station Road, Langley, Bucks.

BRITISH STEEL FOUNDERS' ASSOCIATION, Research and Development Division. Applications are invited for the following positions:

(1) **SENIOR SCIENTIFIC OFFICER**, to be responsible to the Director of Research for the supervision of the Division's researches relating to the metallurgy of the steelmaking and welding processes and to the mechanism of solidification of steel castings. Applicants will be expected to have had industrial research experience and should hold an appropriate higher degree. Salary according to ability, experience, and qualifications.

(2) **SCIENTIFIC AND TECHNICAL OFFICERS.** (a) Metallurgist, graduate or A.I.M., for research and development work related to the physical and mechanical properties of carbon and alloy steel castings. (b) Mechanical engineer, preferably graduate or A.M.I.Mech.E., for development work in relation to steel-foundry plant. Salaries from £600 per annum.

(3) **SENIOR TECHNICAL ASSISTANTS.** (a) Metallurgist, preferably graduate or A.I.M., for research in relation to steelmaking processes for steel-castings production. (b) Graduate Metallurgist for the post of Assistant Information Officer, preferably with knowledge of French and German. Salaries from £450 per annum.

All positions advertised are permanent and superannuable. Applications will be treated as confidential and should be sent to the Secretary, Research and Development Division, British Steel Founders' Association, Broomgrove Lodge, Sheffield 10.

METALLURGICAL CHEMIST required to establish works laboratory in modern factory in South Wales for control of raw materials, investigation into production problems, development of new processes. Experience in analysis of non-ferrous metals, plating, finishing, and heat-treatment processes including anodizing is essential. Post offers scope for initiative and carries good salary with pension scheme. Box No. 329, Institute of Metals, 4 Grosvenor Gardens, London, S.W.1.

THE DIVISION OF ATOMIC ENERGY (PRODUCTION) invites applications for the following appointments in the Research and Development Branch:

Post A. PRINCIPAL METALLURGIST to organize and direct teams engaged on large-scale development work at Springfields Factory, Salwick, nr. Preston. Candidates should be capable of originating new lines of scientific thought and of applying metallurgical principles to industrial processes. A special knowledge of physical metallurgy, metallography, melting, and casting or fabrication processes is desirable.

Post B. PRINCIPAL METALLURGIST at Risley, nr. Warrington, to advise on the metallurgical aspect of plant design for the production of atomic energy; to assess future requirements with the object of initiating metallurgical development work and to interpret the results for use in design.

Candidates for both posts must have either a first- or second-class honours degree in metallurgy or physics, associateship of the Institution of Metallurgists or the Institute of Physics, or an equivalent qualification. They must have had several years' experience in responsible positions in the metallurgical field. Exceptionally, candidates who do not possess the above qualifications but who have evidence of high professional attainments, will be considered.

Salaries will be assessed according to qualifications and experience within the range £1177-£1370 p.a. There is a voluntary superannuation scheme. Houses will be available within a reasonable period for the successful candidates, if married. Applications to Ministry of Supply, D.At.En.(P), Risley, nr. Warrington, Lincs., stating post applied for and quoting reference 292.

THERMODYNAMICS OF ALLOYS

By JOHN LUMSDEN, B.Sc.

(Research Department, Imperial Smelting Corporation, Ltd.)

Institute of Metals Monograph and Report Series, No. 11

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This monograph deals with the application of thermodynamics to the quantitative study of metals and alloys. The fundamental theory of the subject is presented first, and is followed by some illustrative calculations on pure metals. Then the theory of solutions is developed and exemplified by calculations on solid and liquid alloys. Emphasis is laid on the usefulness of thermodynamics for the accurate correlation of various equilibrium properties. Attention is particularly directed to the information that can be deduced from phase boundaries. Detailed calculations are presented on some typical systems for which measurements of vapour pressures, electrode potentials and heats of mixing are available; these results are combined with

a study of liquidus, solidus and solid-solubility curves to derive the activities of both components in the liquid and solid phases. It is shown how a free-energy equation for a system, deduced from a suitable set of accurate experimental measurements, furnishes a reliable basis for calculating other equilibrium properties. To assist in numerical calculations, tables of functions that continually recur in thermodynamic problems are provided.

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(*Institute of Metals Monograph and Report Series, No. 10*)

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In this specially commissioned monograph, Dr. Hanstock, who is Chief Physicist to High-Duty Alloys, Ltd., has made a comprehensive survey of the various methods that are available for the non-destructive testing of metals, ranging from liquid-penetration methods of crack detection to the use of X-ray diffraction for the determination of grain-size and orientation and for the measurement of internal stresses. Special attention is devoted to damping-capacity measurements as a means of non-destructive testing, a field in which the author himself has worked extensively in recent years.

Throughout, emphasis is laid on the physical bases of the methods described, with specific examples of their

application in many cases. The use of the book is facilitated by an Appendix in which are given in tabular form the properties that may be assessed by non-destructive means, the various methods applicable in each case, and brief comments on their suitability and limitations.

CONTENTS

Measurement of Thickness; Evaluation of Surface Finish; Detection of Cracks; Radiography; Ultrasonics; Dynamic Tests; Damping-Capacity Measurements; X-ray Diffraction, Electrical and Magnetic Methods; Methods of Analysis.

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